

REMARKS

The claims remaining in this patent application following amendment are claims 1-20, inclusive. Claim 21 has been cancelled. The applicant hereby affirms the provisional election made on May 12, 2002 to prosecute claims 1-21 in this patent application. Original claims 22-52, which are the non-elected claims, have been withdrawn from further consideration. No new claims are presented. Claims 1-5 and 9 have been amended.

The Examiner's interpretation of claim 4 has been noted. However, while the Examiner suggests that the limitation recited in original claim 4 is not entitled to patentable weight, the applicant points out that claim 4 is a "product by process" claim and, therefore, does contain a limitation which is germane to the patentability of the claimed ceramic matrix composite tubular shell structure.

Claims 2-5 and 9 are rejected under 35 U.S.C. 112, second paragraph, as containing improper Markush-type language. Each of claims 2-5 and 9 has been amended to conform with the proper Markush practice. Therefore, it is submitted that each of claims 2-5 and 9, as amended, is now presented in a form which complies with the requirements of 35 U.S.C. 112, second paragraph.

Claims 1-16 and 18-21 are rejected under 35 U.S.C. 103 as being unpatentable over the patent to Haidn (6,151,887) in view of the patent to Smith (5,523,133). Original claim 21 has been cancelled and, therefore, the rejection thereof is rendered moot. For the following reasons, the aforementioned rejection is respectfully traversed and reconsideration thereof is requested.

Independent claim 1 has been amended to point out that the applicant's fibrous preform is manufactured from refractory fibers that extend continuously throughout inner and outer walls thereof and around a plurality of cooling channels that are formed between said inner and outer walls. Moreover, independent claim 1 has also been amended to recite that said plurality of cooling channels are formed by a corresponding plurality of radially extending webs that are spaced from one another and integrally connected between said inner and outer walls to create a unitized monocoque (i.e., a one piece) tubular structure. Regardless of the teachings of Smith, no reasonable interpretation and combination of Haidn in view of Smith will result in the unitized monocoque tubular structure having refractory fibers extending continuously throughout the structure to provide maximized structural integrity in the manner recited by independent claim 1, amended.

In fact, the teachings of Haidn clearly describe a tubular ceramic structure consisting of a pair of pieces rather than the monocoque (i.e., one piece) tubular structure claimed by the applicant. In this same regard, because one of the pieces disclosed by Haidn is machined, the ceramic structure of Haidn lacks the continuously extending refractory fibers and the improved structural integrity as claimed by the applicant. In particular, the plurality of cooling channels claimed by the applicant are integrally formed within the fibrous preform of the applicant's tubular shell structure. That is, and as best shown at Figure 9 of the applicant's drawings, the plurality of cooling channels claimed by the applicant are established between a corresponding plurality of radial webs that are spaced from one another and integrally connected between the inner and outer walls of the applicant's fibrous preform.

The foregoing one piece monocoque tubular structure claimed by the applicant in independent claim 1, amended, is distinguishable from the multiple piece structure described by Haidn wherein separate and distinct inner and outer shell pieces are bonded together (by means of molten silicon) to define an interface therebetween. The cooling channels of the multi-piece Haidn assembly are machined into the inner shell thereof. Thus, unlike the continuous fiber reinforcement disclosed and claimed by the applicant which maximizes structural integrity throughout the shell structure, the fibers of Haidn are not continuous and do not extend past the interface between the inner and outer shell pieces, such that the multi-piece assembly of Haidn will be susceptible to possible separation and failure under high pressure. Quite clearly, the cooling channels of Haidn, which are machined into the inner shell of the multi-piece shell assembly, are not the same as or equivalent to the plurality of cooling channels that are formed between spaced, radially extending webs that are integrally connected between inner and outer walls in the one piece monocoque shell structure claimed by the applicant in independent claim 1, amended.

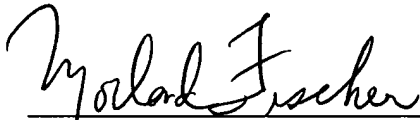
Thus, it is believed that independent claim 1, amended, recites a one piece, unitized monocoque ceramic matrix composite tubular shell structure having integrally connected inner and outer walls and a plurality of cooling channels formed therebetween which is patentable over the teachings of Haidn in view of Smith. Inasmuch as independent claim 1, amended, is believed to be patentable, claims 2-20, which depend therefrom are likewise believed to be patentable.

Claim 17 is rejected under 35 U.S.C. 103 as being unpatentable over the aforementioned patent to Haidn in view of the aforementioned patent to Smith in further view of the patent to

McAninch et al (5,221,045). Claim 17 is dependent from independent claim 1. Inasmuch as independent claim 1, amended, is believed to be patentable, claim 17, which depends therefrom, is likewise believed to be patentable.

In view of the foregoing, each of claims 1-20 remaining in this patent application after amendment is believed to recite a patentable invention. Accordingly, reconsideration of the Examiner's rejection is requested and a Notice of Allowance is earnestly solicited.

Respectfully submitted,



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CERTIFICATE OF MAILING

I, Christine Dayeh Ohannessian, do hereby certify that the foregoing documents are being deposited with the United States Postal Service as First Class Mail, postage prepaid, in an envelope addressed to Mail Stop: No Fee Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria VA 22313-1450 on this date of August 5, 2003.

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